

The timer stops when the announcement begins to play and restarts when the announcement completes playing. When the two minutes is completed, the call is disconnected in an operation 414 when the customer has no time remaining in the account.

For a "soft-stop" option, the server plays an announcement in an operation 416 when the customer has no minutes remaining in the account. Again, the voice response unit is activated to play the announcement, "YOU HAVE REACHED YOUR LIMIT BUT WILL BE ALLOWED TO CONTINUE TO TALK. IF YOU WOULD LIKE TO REPLENISH/MODIFY YOUR PURCHASE LIMIT, PLEASE CALL 1-800-555-5555." The announcement is heard only by the calling part. The timer stops when the announcement begins to play and restarts when the announcement completes playing. For the "soft-stop" option, the call continues after the announcement in an operation 418. The calling party is billed for the entire duration of the call.

FIG. 4 discloses a budgeted calling service in which the provision data base 226, routing database 228' and rating table database 230' are distributed throughout the network 100 and to which the network switches 80, 90, and the like have access to such databases. FIG. 4 enables a memory 202 (See FIG. 2) of the control server to be reduced in size and further distributed throughout the network, thereby increasing the response time for budgeted services to customers.

FIG. 5 discloses still another embodiment of providing budgeted service to customers. In FIG. 5 the control service is connected to the local exchange carrier switch 520 which is connected to the network switch through link 52', and the phone through link 50'. Again, the memory 202 (see FIG. 2) may be reduced because the number of customers served by the switch 520 will be less than the number of customers served by the server and the system shown in FIG. 1.

FIG. 6 discloses a budgeted calling service incorporated into a mobile telephone system 700. Customer/Users  $U_1 \dots U_2$  are connected to base stations  $701^1 \dots 701^n$  for transmitting and receiving calls among the customer/users and to a public switch telephone network (PSTN) 702. The base stations  $701^1 \dots 701^n$  are connected to the base station controller 704 which manages the calls among the connected base stations for transmission to a mobile switching centers  $706^1 \dots 706^n$ . The mobile switching centers 706 are coupled to the network 702 for transmitting and receiving calls from customers 707 connected to the network 702. The mobile switching center 706 includes a Home Location Register (HLR) 708 which is stored on a computer and accessed whenever a mobile customer or subscriber is called or registers within an area. The home location register identifies the subscriber and indicates the part of the country in which the subscriber is present or is normally located. When accessed, the information about the individual subscriber is transferred to the mobile switching center 706 serving the cell where the subscriber is located. Associated with the home location register is a Visitor Location Register (VLR) 710. When a mobile phone is switched on, its data will be retrieved from a HLR somewhere on the network and stored in the VLR on the switch serving the cells in the area where the phone is located. The HLR will note the identity of the current VLR and the fact that the mobile is inactive. Incoming calls for the mobile will interrogate the HLR based on the knowledge of the mobile's number and where each number is stored. When the mobile unit is activated, the call will be routed to an appropriate VLR for paging the mobile. The control server 125 is connected to the switching centers 706. As budgeted calls are initiated by a mobile subscriber,

the call is initially directed to the control server 125 which implements the process of FIG. 3 after comparing the address of the customer in the home location register with the provisioning data base. The call is completed and monitored by the mobile switching center after the routing information is supplied by the server 125 and the time and dollar balance for the customer are established. The voice response unit is initiated by the control server and the welcome announcement is played by the voice response unit and transmitted to the calling party. The call is monitored by the control server and, as previously described in conjunction with FIG. 3, the hard-stop and soft-stop announcements are played prior to the expiration of the time and dollar balance in the customer account stored in the rating database.

In summary, the present invention provides budgeted calling service for customers identified with a unique telephone line in which the calling time and dollar amount are stored in a control server coupled to a communications network. A customer activates the service using the regular toll prefix "1" and not a special toll number or a credit card number, as in the prior art. The server responds to the customers and monitors their calls for time and dollar amounts against an account stored in the server. When the account balance approaches a limit, the control server activates a voice response unit to send announcements to the calling customer indicating the account balance has been expended. The customer has the option of terminating the call or continuing the call with subsequent payment for the unaccounted balance. The customer is also provided an "800" number or, alternatively, may be requested to contact the local service representative for renewing the budgeted amount or extending the budgeted amount. The options to call an "800" number or contact a local service representative facilitates using the communication network while still controlling the time and dollar amount for calls placed in the network. The customer may arrange payment for the budgeted service on a pre-paid or post-paid basis. Also, the customer may modify the hard stop option by authorizing calls exceeding the budgeted amount to be charged to his irregular telephone account.

While the invention has been shown and described with respect to specific embodiments, various modifications may be made therein without departing from the spirit and scope of the invention, as defined in the appended claims, in which:

We claim:

1. In a communication system including at least one network switch coupled, in part, to at least one caller via a telephone line uniquely associated with that caller for receiving a call from that caller to a destination and for establishing the caller's identity in accordance with a number associated with the caller's telephone line, comprising:
  - a) a database storing information in accordance with said caller's telephone line number, said information indicating a budgeted calling amount for said caller;
  - b) a control processor responsive to a call initiated by the caller for accessing the data base to obtain said information in accordance with said caller's telephone line number and for establishing a maximum allowable time length for the caller based on said information and on said destination of said caller's call, said processor further monitoring said call in progress to determine how much time has elapsed for said call; and
  - c) a voice response unit coupled to the processor and to the network for sending at least one message to the caller indicative of the amount of time available to the caller.

2. The system of claim 1 further comprising means for the call to be placed directly to a called party without accessing a special toll number.

3. The system of claim 1 further comprising:

a) means for sending the at least one message to the caller prior to the expiration of the budgeted calling time and amount and terminating the call upon expiration of the budgeted calling time and amount.

4. The system of claim 1 further comprising:

a) means for sending the at least one message to the caller prior to the expiration of the budgeted calling time and amount and continuing the call with a warning to renew or extend the budgeted calling time and amount upon completion of the call.

5. The system of claim 1 further comprising:

a) means for sending the at least one message to the caller prior to the expiration of the budgeted calling time and amount and allowing the call and subsequent calls to continue after expiration of the budgeted calling time and amount subject to the calling costs thereof being billed to the calling customer.

6. The system of claim 1 further comprising:

a) means for sending the at least one message to the caller prior to the expiration of the budgeted calling time and amount and allowing the call to be completed after expiration of the budgeted calling time subject to an additional charge to the customer.

7. The system of claim 1 further comprising:

a) means for enabling the calling customer to pre-pay the budgeted calling time and amount before initiating a call using the budgeted time and amount.

8. The system of claim 1 further comprising:

a) means for enabling the calling customer to pay the budgeted calling time and amount after the budgeted time and amount have been depleted.

9. The system of claim 1 wherein the data bases are distributed throughout the network.

10. The system of claim 1 wherein the databases include stored program instructions for implementing the announcement and monitoring processes in the control process and associated with the call.

11. The system of claim 1 wherein the control processor and voice response unit are connected to a local exchange carrier.

12. The system of claim 1 in which the communication system is a wireless telephone system.

13. In a communication system including a network coupled through local exchange carriers and a network switch to a telephone line uniquely associated with a customer having budgeted telephone calling time and an amount available for telephone calling recorded in the system, a server coupled to the switch for automated control of the customer budgeted telephone calling time and calling costs, comprising:

a) a control processor having access to a rating database and a telephone call routing database; the rating database containing stored information indicating remaining customer prepaid budgeted telephone calling time and cost available to each calling customer; the routing database providing instruction for directing routing of budgeted telephone calls from the calling customers to called customers, after acceptance by the processor;

b) a voice response unit coupled to the processor and the network for sending messages to the calling customer in response to the processor at the beginning of each budgeted telephone call to the called customer indicat-

ing remaining budgeted telephone calling time and amount available to the calling customer for the telephone call; and

c) means for tracking the budgeted telephone call in real time and initiating a voice message advising the calling customer when the available time for the telephone call will terminate, using the budgeted calling time and amount.

14. The communication system of claim 1 further comprising:

a) means for disconnecting the budgeted telephone call when the time and cost thereof exceed the available budgeted time and amount for the calling customer.

15. The communication system of claim 1 further comprising:

a) means for extending the telephone call after the telephone call has exceeded the budgeted time and amount and before the telephone call has been terminated.

16. A method for enabling at least one caller placing a call to a call destination through a communications network via, in part, a telephone line having a number uniquely and permanently assigned to said one caller to budget call costs, comprising the steps of:

a) storing in a rating data base budgeted information for said caller in accordance with said caller's unique and permanently assigned telephone line number;

b) receiving said call placed by said caller, and in response, establishing said caller's telephone line number;

c) accessing a routing database for a call cost to direct the call to the call destination;

d) accessing the rating data base to retrieve said budgeted information in accordance with the caller's telephone line number;

e) determining from said budgeted information and from said call cost for said call destination, a maximum allowable time length for said call;

f) monitoring the call in progress to determine how much time has elapsed; and

g) providing at least one voice announcement to the caller indicative of the time available to the caller.

17. In a communication system including a network coupled through local exchange carriers and a network switch to at least one caller at a permanently assigned telephone number and having a budgeted telephone calling time and amount available for telephone calling recorded in the system, a method for automated control of the budgeted telephone calls and calling costs, comprising:

a) initiating a telephone call in the system at the permanently assigned number by a customer using the budgeted time and amount recorded in the system;

b) accessing a rating database using a control processor in response to the telephone call; the rating data base containing stored information indicating remaining budgeted telephone calling time and amount available to the calling customer;

c) accessing a telephone call routing database providing instruction for routing the telephone call from the calling customer to a called customer and calling cost for such call, after the telephone call has been accepted by the processor;

d) determining from said budgeted information and from said calling cost a maximum allowable time length for said call;

e) sending a voice message to the calling customer at the beginning of the telephone call to the called customer

indicating remaining budgeted telephone calling time and amount available to the calling customer for the telephone call, based upon the maximum allowable time length for said call; and

f) tracking the telephone call in real time and initiating a voice message advising the calling customer when the available time for the telephone call will terminate.

18. The methods of claims 16 and 17 further comprising the step of:

g) enabling the caller in advance of the call to select between a first option identified as a "hard-stop" and a second option identified as a "soft-stop" for terminating

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the call when the budgeted amount for telephone calls has been exceeded.

19. The methods of claim 18 wherein the "hard-stop" provides the caller a call termination warning in advance of exceeding the budgeted amount, after which the call is terminated or the caller is provided with an alternative for call payment.

20. The methods of claim 19 wherein the "soft-stop" provides the caller, after exceeding the budgeted amount, notice of a change in call payment method while allowing the caller to continue calls in progress and place new calls.

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